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THE CHICAGO MEDICAL SCHOOL

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DR. JOHN J. SHEININ

Dean of The Chicago Medical School

EDITORIAL

THE QUARTERLY of The Chicago Medical School today is a reality. For months we have heard, planned and hypothecated much about it. Now, those plans and hypotheses have materialized to express our ideas and the results of our work. Henceforth, we, as students, alumni and faculty of The Chicago Medical School have an opportunity to hear our own fellow colleagues and to be heard by them.

To all those who have helped make this possible, we express our deep appreciation.

To Dr. Sheinin we feel especially grateful and to Dr. Sheinin we dedicate this first issue. As an anatomist, he has gained a brilliant reputation far beyond the walls of our institution. As a teacher, he is highly respected by all those who have studied under his tutelage.

But we at The Chicago Medical School have also grown to know him as a sympathetic advisor and friend. To us he represents not only the impersonal genius of a man who is guiding the school to more progressive educational standards and greater recognition, but also as a man whose sincere interest is the welfare of our students, both past and present.

Therefore, we dedicate this issue of THE QUARTERLY to our Dean, Dr. John J. Sheinin, as an expression of our gratitude and esteem to a competent teacher, brilliant anatomist, efficient executive, and above all, an understanding advisor and friend.

We at The Chicago Medical School begin our publication in the midst of turbulent events throughout the world. The peoples of large sections of the world are again exposed to the horrors of modern warfare. Spain has been racked by the cruelties of battle followed now by years of famine. China has known the invader's sword for decades. All of Western Europe is being ravaged by heartless conflict, the real conclusion of which will not be reached at the armistice. For every day that London or Berlin is bombed, so many years will it take to reconstruct these great metropolises.

We in our microcosm of medical school in a country at peace become myopic to the outside world shut out by academic walls. The pathology of hypernephroma or the physiology of peristalsis seems of more significance to the average medical student than a thousand killed in an aerial bombardment of a European city in which there are five medical schools. Only when our own individual insecurity is brought uncomfortably within our focus by means of selective service questionaires do we first begin to cogitate.

Recently a letter was received by a member of the of the staff from a British friend who is studying medicine under war-time conditions. Its significance was pregnant in the message describing the loss of competent teachers, the absence of proper facilities, the difficulty of study because of air raids. Such messages ring with a reminder that medicine and all sciences are most productive, most progressive in periods of peace. Such messages are advice for the medical student to support all effort which will insure the stability, and advancement of his own profession and the health services of the nation as a whole.

It is for the medical man, student as well as practitioner, to support actively those organizations whose aims are to achieve these goals.

Many of us are members of organizations both within the confines of our school and outside that realm. Such groups are most effective in teaching the spirit of cooperativeness.

Today, our journal offers us, whether we be students, alumni, or faculty members, the opportunity to cooperate in presenting an effective organ of the school. It is an opportunity for each of us to hear what our colleagues are doing or thinking.

Such an opportunity requires the wholehearted support of everyone. We want your suggestions, your literary masterpieces, your scientific findings. In other words, we want to hear from you.

Any article will be considered for publication if it meets with a minimum standard of general interest and authenticity. Our columns are open for your criticism. We hope to include in the future issues a column of "Letters to the Editor". Express your opinions.

This issue of THE QUARTERLY, we believe, has obtained certain qualities which we hope will persist. But there is room for improvement. Such improvement requires your full cooperation, requires your willingness to help by writing articles, suggesting changes.

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The Internal Treatment of Syphilis with Stovarsol (Acetarsone)

By Dr. M. Oppenheim
Professor of Dermatology and Syphilology, The Chicago Medical School

The internal treatment of syphilis did not play a great part in the therapy of syphilis. It is widely known, that after the return of Columbus to Spain from America, Guiac decoction was usde in Europe against syphilis, which appeared as an epidemic. At that time, the use of wood-decoction and mercurial fumigations in alliance with sweating cures were the main parts of anti-syphilitic procedures. After the discoverey of arsphenamine (salvarsan) by Ehrlich the internal treatment of syphilis was made only in the form of mercurial pills and powders and iodine-compounds chiefly as very mild cures and for congenital syphilis in babies.

This was changed with the introduction of stovarsol (acetarsone) by Fourneau, Levaditi and Navarro-Martin in 1922. At first the dermatologists mistrusted the new drug, for in the flood of new remedies, syphilis has been favored with more than its share. Hardly a day passed without a new anti-syphilitic drug being recommended, especially of the arsenical and bismuth types. A few months ago a new bismuth preparation for internal application was highly recommended in this country. One is, therefore, skeptical in advance and is inclined to undertake to test a new preparation only when important reasons justify a trial. The reasons which induced me to test acetarsone (stovarsol) were: first, the chemical constitution of the drug (a pentavalent arsenical) which had been already prepared from atoxyl by Ehrlich; secondly, the names of the authors who sponsored it; further, and this was an important consideration, the method of introducing the drug into the body, i.e., its internal administrations; and last but not least, the fact that syphilo-therapy becomes increasingly difficult as more numerous and larger doses of arsphenamine—in the last months the recommendation of permanent infusion of high doses of arsphenamine and mapharsen, for instance—as well as of other antisyphilitic drugs are used.

Without going into details I shall state only that the drug is acetylated hydroxy-amino phenyl—arsonic acid, a preparation closely related to arsphenamine and which can be obtained from atoxyl.

Ehrlich rejected the para-hydroxy-meta-amino-phenylarsonic acid because in mice it produced nervous disturbances two weeks after injections which began as chronic trembling of head and neck and finally turned the animals into "dancing mice." He concluded, therefore, that this compound does not admit of practical application.

In February 1924, I presented my first cases treated with acetarsone in the Viennese Dermatological Society and a rough estimate shows that up to the present, i.e., in sixteen years I must have applied it in more than three thousand cases.

I have found the following to be indications for acetarsone-therapy:

Most investigators, as well as myself, take the view that acetarsone should be used in all cases, where prophylaxis against syphilis seems necessary. The advantages of acetarsone, in comparison to arsphenamine, are that while it is just as effective as arsphenamine in this regard, it does not stigmatize the patient as a syphilitic, that its administration is very simple, and finally, that it seems to remain effective for a longer period after infection, according to Levaditi and his co-workers. Prophylactic treatment should be given to: (1) every person who has had intercourse with a syphilitic or with a person suspected of syphilis; (2) every person (physician, nurse, midwife), who had injuries on hands while handling syphilitics or incurred abrasions while treating them, and; finally, (3) wet nurses who take care of children with congenital syphilis.

A second indication is in the treatment of nursing infants with congenital syphilis. Many authors recommend the treatment of congenital syphilis of new-born and small children with acetarsone, particularly in combination with mercury. In my opinion, small doses (beginning with 0.01 gm.) which I was the first to recommend, are to be preferred, but such doses must be given for a sufficiently long period of time. An important factor in this therapy is the convenience of administering the drug in powder form, and the rapid increase in weight, which is nearly always observed.

The treatment of gummata is another indication, particularly of the ulcerative forms of the larynx and

pharynx, because here obviously a favorable local effect is combined with a general action. The results of acetarsone therapy can stand comparison only with those of arsphenamine treatment, being in some respects even better. One must avoid, however, Jarisch-Herxheimer reactions, for they may lead to dangerous mucous membrane swelling edema of the glottis).

Treatment of syphilitic mesaortitis is another indication. I have treated cases which showed not only improvement in subjective symptoms, but also a genuine diminution of the aortic dilation. A Herxheimer reaction must be avoided here too, otherwise an aortic or sterno-cardiac attack may follow. Syphilis of the liver seems also to respond well to acetarsone.

Finally, all those cases should be submitted to acetarsone treatment where arsphenamine cannot be given for some reason, e.g., when an intravenous injection is impossible, because the veins are imbedded too much in fat, lie too deeply, or are too delicate, or when a patient is over-sensitive to arsphenamine. but not to acetarsone. Reliable patients, who cannot visit the physician regularly for occupational reasons, should also be given acetarsone instead of arsphenamine.

One more indication for acetarsone therapy seems to be in the effect of acetarsone upon the spinal fluid This, however, still stands in need of careful verification. I was the first who published cases where the first acetarsone administration called forth in tabetics an intensification of the "lightning" pains, which was to a certain degree a Jarisch-Herxheimer reaction, proving that it had a specific effect on the nervous system. The observations of Ehrlich have already made it probable that acetarsone contains a strong neurotropic element. In 1922, Raiziss and Gavron showed that the pentavalent arsenicals pass through animal membranes much more rapidly than the trivalent ones, and in 1930 Raiziss and Severac proved experimentally that the pentavalent arsenicals penetrate into cerebrospinal system more easily.

Dattner found that combined acetarsone-iodine therapy should find a place among the therapeutic methods in neurosyphilis with positive cerebrospinal fluid.

The question of dosage is of great importance. For ordinary syphilis of adults 0.50 gm., 0.75 gm., and 0.75 gm. stovarsol is given on three consecutive days, that is 2, 3, and 3 tablets to be taken every morning at an interval of three days on an empty stomach. These are to be mixed with a little water and taken. Half a tumbler of water is then drunk and breakfast taken half an hour later. Acid food and wines are to be avoided. Stovarsol may lead to Jarisch-Herxheimer reactions which manifest themselves as a flaring up of a rash, increase of glandular swelling, appearances of efflorescences, aortic or heart-block attacks and lancinating pain in tabes. In such cases I begin with very small doses, 0.05 gm. each in three following days, and gradually increase it to 2 gm. in three days. Like Levaditi, I give a total dose of one tablet per kgm. of body-weight, i.e., the total dose amount for body-weight divided by four grammes. A patient of 65 kilos takes 65 tablets that is 16 grammes totally.

Prophylactic treatment is undertaken within four or five days of exposure to infection. Within 24 hours I give 3-4 tablets daily for three days every morning on an empty stomach and after an interval of three days a second course is given; if however, more than 24 hours have elapsed, the course is repeated several times always with three days' pause. In congenital syphilis the dose is adjusted to body-weight. In the new born, contrary to other authors, I begin with a very small dose, normally 0.01 gm. daily with three days pause and gradually increase to one tablet per kgm. of body weight. In infants and older children, a dose calculated on the basis of body-weight is given and then combined with mercury inunction and bismogenol injections. With this method I obtained very satisfactory results.

One should also take precautions against a rash similar to the salvarsan rash. With the appearance of itching and erythematous or urticarial patches, especially of the extensor side of the legs and arms, the treatment should be suspended. In marked erythema and stovarsol dermatitis, the treatment should be immediately suspended and intravenous injection of sodium thiosulphate given. Stovarsol administration should also be interrupted in fever; or if urobilinogen appears in urine and if diarrhoea and gastro-enteritis supervene. When all these precautions are taken, stovarsol yields very good results.

From my clinical experience I can say that it is a comparatively harmless and fairly active specific against syphilis; indication of stovarsol treatment is not only in prophylaxis, congenital syphilis,

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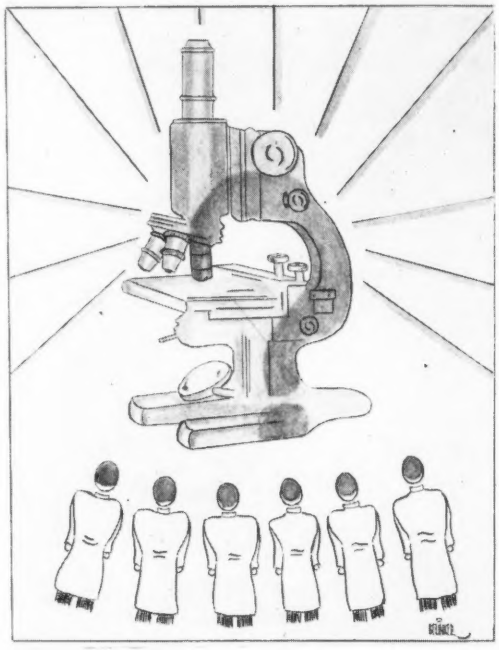
A Freshman's Perspective

By DANIEL HALPERN

The story that started this article concerns a little old man with an old battered instrument case which he carried very tenderly under his arm. He was not exactly what one would call well-dressed, and he walked with a quiet unassuming air. His hat in one hand, the case in the other, he entered the sumptuous ante-chamber of the office of a very well-known millionaire. As he came in and took a seat in one corner of the room, one of the men seated around the room was proudly explaining the nature of his visit. "After the years of research I have invented," he was saying, "a new type of cannon, which can shoot half-way around the world. It combines all the best features of concussion, shrapnel, poison gas, and liquid flame. Its projectile, on striking an object, tears a hole in the earth a mile wide and the lethal gas and molten fire can destroy everything within a radius of 50 miles."



A second scientist, well wrinkled by years of profound investigation into the theories of electromagnetic waves and other such physical abstracts, put in, "Highly commendable that, but let me tell you about my invention. I have here a design for a torpedo that can not only follow its target any place in the water, but it can also climb out and run along the ground and like an animal, follow its quarry any place it may hide."

A third began to look patiently contemptuous. "I have completed, after many years of research, a complete seismological map of the world. I know every weak spot in the earth's crust, and according to my plans, I can calculate exactly where to place an explosive charge, somewhere, say, in the Atlantic or the Pacific oceans, so that an entire continent can be wiped out, and sunk into the sea. Of course there is a difficulty in confining the earthquake only to enemy territory, but I think I've got that figured out." At this point, the old man picked up his case and started for the door. "Oh, why are you leaving?" the others asked. "Aren't you going to tell us about your invention?" The old man turned and said, "I don't think this is the place for me. You see, I invented something that would wipe out completely the common cold."

Seriously thinking, though, one does begin to wonder at the use of science today. But further than that, one begins to examine the science with which one is most closely connected. What perspectives are in view for those entering the medical profession? How does one fit into the profession? How does the profession fit into the greater scene? What does the the medical profession look like to a freshman?

Both in and out of routine class work, one learns of new possibilities of fighting disease, and bad health. The spleen, mystery organ up till now, takes on the aspect of being infection fighter number one. More work on it is asked by the texts. Wandering macrophages, develop from the first impression of aberrant inebriates of the body to front line chemical warriors against infection, poison and allergy—the creators of the antitoxin defense of the body. But still not much is known about the hows and whats and more work needs to be done. And as time goes on, while study-

ing what has been done, one learns more of what must be done.

But what about the possibility of doing such work? Teaching positions are the only ones which can supply the equipment, time (perhaps) and relief from financial burdens to make such research possible. But such positions are notoriously scarce. Where they exist, because of the necessity of making education a financially solvent enterprise enough money is often not available. But this is minor. The man difficulty lies in the fact that because the ordinary physician finds the pressure of his daily practice so great, that he must of necessity separate himself from education and research work. It is economically necessary for him to separate himself from education and research work. The result of this is that the average physician does not keep up with new developments and, therefore, treatment and methods are not in general use until several years after their development. This is bad enough. But more important, from the standpoint of scientific progress, is the fact that a major portion of research is not done by those who have actual day-to-day experience in practical problems. A gap tends to grow between what text-books writers think, and what practical workers find. This is a tremendous hindrance and while many realize it, they necessarily fail to overcome it. The fault does not lie with individuals but with the absence of an intimate active correlation and interchange of understanding to unify theory and practice. New developments in medical organization will have to take this into account, if medicine is not to become a "practical" groping in the dark on the one hand or a futile theorizing on the other. Not merely a closer relation of practicing physician to research worker is the object, but an integration of both, embodied in each member of the profession.

All this, of course, does not mean that nothing has been achieved, or that nothing can be achieved. We, the medical profession, have limped along, even by leaps and bounds in isolated cases up till now. But, that would be as nothing compared with what could be done by a profession whose entire level had been raised. But now consider what has been done. How is that connected with what is, after all, its ultimate purpose? Has all, even of what medicine has to offer the population as a whole, been made available to those who need it?

In a discussion on this subject in a book entitled "American Medicine," a survey of many aspects of medicine today made up of contributions from many prominent men in American medicine, the question is answered in two different ways. The best way to illustrate this is to take representative quotations from the text. A Connecticut surgeon, FACS, writes: "During my nearly forty years in the practice of medicine and surgery, I have yet to see any cases entitled to medical care that have been neglected because of our system."

Similarly, from the chief of staff of an upstate New York hospital, FACS, comes the statement following: "In my thirty-five years of practice, I have yet to learn of a single case that did not receive medical service when solicited or of a complaint of the type of service provided."

Many reports of this type were given. Others in certain communities, which are above average because of peculiar circustances, go into the details of equipment, roads, number of doctors, services provided, etc. One report from a college town also gives similar favorable reports. Perhaps the perspective is developed further by the following:

A former president of the AAMC writes: "I think there is a good deal of evidence to show that only people with family incomes above $5,000 regularly receive satisfactory care. Since the bulk of the population is below this level this situation seems to me serious."

From a survey in Wisconsin by a former president of the State Medical Society of Wisconsin FACP, "This survey revealed that more than 94% of the families of this state had incomes under $2,000 a year and that probably 50% had incomes of less than $1,000 a year. It is quite evident that on such incomes adequate medical service cannot be paid for without seriously disturbing the financial set-up of the family involved."

Other reports indicate that for such reasons as remoteness, especially of rural regions and small industrial towns, from hospitals, nursing, etc., especially in the South, the Middle West and the West, and also ignorance of the population of the potentialities of medicine, are other reasons for lack of adequate medical care. The total of all of these according to the latest figures is about 50% of the population.

Evidence has been accumulated in many reports showing that the medical profession knows enough that, with the proper conditions, such as housing, clean living-conditons, removal of overcrowded slum areas, the incidence of such diseases as tuberculosis,

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rheumatic fever and other lung and heart conditions can be materially reduced to a fraction of the present degree. By dissemination of the proper educational material and organization of proper hospitalization and clinical facilities, venereal diseases can be practically wiped out at the present stage of our scientific information. Deficiency diseases are the prime contradiction. The same thing holds true with many other ailments. But, medicine comes face up against the black wall of poverty, slums, and ignorance, which are the real causes of these diseases—bacteria notwithstanding. Ordinarily, this seems bad enough, for with days of war across the sea we hear of murderous typhoid and dysentery epidemics playing havoc with an already starving population, and starving because of both scarcity of food and rise in prices, which inevitably are the fellow travelers of war.

So the responsibility of a medical man goes far beyond his everyday practice and research. It is also part of his problem to get the medical care to the people. This firstly involves the planning of a good health program. Depending upon the individual's surroundings and abilities, this can range in scale from rural hospitalization and treatment service to a broad national program of hospitals, clinics, nursing services, etc. Secondly, it involves the preparation and development of legislation which would put into practice the plans for safeguarding the health of the people. This is the special realm of the medical profession, because it is all too often neglected by political authorities, who have partisan, sectional or predominantly personal lobbying interests, or due to lack of information. A case in point is such a bill as the proposed Murray Bill, which is designed to prevent the anarchic recruiting of physicians, dentists, internes, residents, and medical students into the army under the Selective Service Act. Under such conditions, a complete waste of their talents would disorganize completely the medical service of the country. This is only a small instance of the constant guidance in health affairs which medicine must render the political authorities on a national, state, and local scale. Thirdly, the education of the public and guidance in public organizations toward the development of a better popular understanding of medical problems, and the betterment of national health.

Perhaps, then, if one were to express best this conception of the physician who supplies the benefits of his science in a healthy, adequate manner, —the conception of a physician's social being as doctor, scientist, counsel, father, mother and brother to the people—it may be pleasant to think of him as the old country doctor we all know, tremendously grown up.

Dr. John C. Evans, in his three years association with C.M.S., has earned a placed forever in our Hall of Fame. Since his beginning efforts, and extending through his two years as vice chairman of the Board, he has fought cleanly to secure for C.M.S. students the position which he believes to be rightfully theirs.

Dr. Evans is a graduate of Wesleyan College, and Berkeley Theological Seminary (affiliated with Yale University), and received his D.D. from the original Cornell College.

He has been an Episcopal rector for twenty years, and for twelve years the religious and education editor for the Chicago Tribune.

He has published an outstanding book on higher education used by prep school masters and high school principals—the first work to deal with the objective selection of a college.

Dr. Dudley Scott Stark is the new chairman of the Board of Directors of C.M.S. Previous to his election at the last meeting, he had been a member of the Board for two years, and delivered the Commencement address in 1938.

He has been Rector of the Saint Chrysostom Episcopal Church for eight years, after long service as vicar in New York City.

He took his undergraduate work at Trinity College, from which he graduated with Phi Beta Kappa honors. His graduate work in theology included study at the Theological Seminary of Harvard University, and a Doctor of Divinity degree at Kenyon College. Later he received an L.L.D. at C.M.S.

He is outstanding in the field of social and educational activity, having established the largest church social service in Chicago, and an enormous summer camp for children in Michigan.

Vitamins

By WILLIAM S. HOFFMAN, M.D., Ph.D.
Professor of Physiological Chemistry, The Chicago Medical School

General Principles—Vitamins are organic compounds which, though present in the normally adequate diet only in minute amounts, are necessary for the maintenance of good health, for optimal development during the growth period, and for proper reproduction. The quantities required are exceedingly small—of the order of micrograms or, at the most, of milligrams, and are of no significance as fuel for the production of energy. The minuteness of the concentrations required suggests that the role of vitamins in the animal economy is that of catalysts and indeed for the water-soluble group of vitamins this suggestion seems confirmed, for the vitamins appear to be in combination with protein and to be acting in this combination as enzymes. Recently some new "accessory food factors" have been discovered which are required in greater amounts than those needed in the case of the established vitamins. These factors—of which, two are choline and linoleic acid—should probably not be placed in the class of vitamins, for it is unlikely that their action is of the same type as that of vitamins.

Vitamins make themselves felt only when their concentration in the body is less than adequate. In other words, from a physiological and clinical point of view, it is the deficiency of vitamins that counts. They do not appear to make a normally healthy animal better in health. (Sherman, however, has attempted to prove that rats fed on higher than supposedly optimal quantities of the vitamins do show in succeeding generations greater size, more fertility, and greater longevity.) For a normal adult person, a well-balanced diet probably contains a clinically sufficient quantity of all known vitamins except Vitamin D. The addition, however, of an extra quantity of vitamins to the ordinary diet may make up for hidden deficiencies and can usually do no other harm than that of producing economic waste. For, though vitamins in tremendous dosages may have pharmaco-dynamic properties which are harmful and which are independent of the physiological function of the vitamins, there is such a wide gap between the therapeutically effective and the toxic dose that it is usually difficult to reach the latter level.

The continued increase of the population of the world during recorded history probably indicates that the common diets of most peoples have never been for any great time grossly deficient in the vitamins. However, in times of war, or under difficult economic conditions, or because of abnormally developed dietary habits, certain vitamin deficiencies have at times become widespread. Well known examples of these are the incidence of beri-beri among Japanese soldiers and sailors, of scurvy on long sailing expeditions, of pellagra in the cotton-growing South, and of rickets among children in the city slums. Besides these endemic factors in the production of vitamin deficiency, there are a number of individual factors which may predetermine for any person a vitamin deficiency even when the diet is a normally, well-rounded one. These can best be outlined:

1. Unusual physiological requirements
   a. Rapid growth, in infancy and childhood
   b. Pregnancy
   c. Hyperthyroidism
2. Diminution in absorption from the gastro-intestinal tract
   a. Diarrhea
   b. Vomiting
   c. Ileostomy
   d. Changes in the mucosa of the stomach and small intestine
   e. Deficiency in or absence of bile
   f. Absence of proper bacterial flora for the production of certain vitamins
3. Inability to convert precursor into the true vitamin
   a. Carotin into Vitamin A
   b. Ergosterol or other sterols into Vitamin D
4. Inability to store the vitamin
   a. Cirrhosis of the liver
5. Conditional vitamin deficiency (prevention of utilization of the vitamin by unusual internal conditions or the presence of toxins.)
   a. Excessive excretion, as in hyperthyroidism or diabetes insipidus
   b. Paraphenylenediamine preventing the

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coenzymatic action of nicotinic acid and riboflavin

Under any of the unusual conditions outlined above the requirements for any or all of the known vitamins may be many times the normal, and deficiency may be avoided at times only by parenteral administration rather than peroral.

Though, from a logical therapeutic point of view, the "shot-gun" prescription of the mixed vitamins in a single capsule is to be deplored, such a method can probably do little harm, other perhaps than dulling the psychotherapeutic value of the physician's medication. The vitamins are undoubtedly inter-related in their physiological functions, and may possibly act synergistically or antagonistically; but there is no evidence of their harmful interreaction in the usual doses.

Historical aspects: The common deficiency diseases have been known for many generations. Beriberi was recognized as a disease by the Chinese more than 2,000 years ago. Scurvy was the bane of sailors in the sixteenth, seventeenth, and eighteenth centuries when long voyages in sailing ships were undertaken. Pellagra has been recognized for at least several generations in southern United States and in Italy. Rickets has, until recently, been a common disease of most civilized as well as uncivilized countries. But, except for isolated and unclarified instances, the concept of these diseases as being due to deficiencies of minute quantities of organic substances in the diet is a modern one. It is true that some ships' doctors in the eighteenth century knew that scurvy could be treated by the administering of the juice of lemons or oranges, that some doctors a hundred years ago prescribed cod liver oil for rickets, and that Takaki a Japanese physician, cured sailors in the Japanese navy of beri-beri by modifying their diet of polished rice. Yet, none of these persons had any concept of vitamins as we now know them. They ascribed the cure to the addition of an antitoxin to an otherwise toxic diet, or to the avoidance of monotony in the diet, or to increase in fat content, or to the avoidance of salt meats, or to some other irrelevant item.

The first clear statement of the existence of dietary factors of the nature of vitamins was made by Lunin of Basle in 1881 who stated that "a natural substance such as milk must therefore contain, besides these known principles, small quantities of unknown substances essential for life." This statement remained completely ignored for years, even by Takaki, who had the best opportunity of understanding it. Even Eijkman, who recently received the Nobel prize for his pioneer work on vitamins, did not appreciate Lunin's report. To Eijkman, however, goes credit for the first scientific production of a deficiency disease in an experimental animal. In 1890, he produced polyneuritis—(or beri-beri)—in fowl by feeding them on the same diet that was responsible for the development of beri-beri in the patients of the hospital in Java where he was employed. He cured them when he was no longer permitted to use the hospital scraps for the diet and had perforce to use a more balanced diet. Even with this evidence it was not until Grijns, in 1896, convinced Eijkman of the importance of the rice polishings in the diet that he was able to recognize the disease as due to a dietary deficiency. By this time or shortly thereafter other investigators had made similar observations. Theobald Smith, for example, in 1895, produced scurvy in guinea pigs and cured the animals by feeding them fresh greens. By 1905 and 1906, Pekelharing in the Netherlands and Hopkins in England had felt warranted in making statements similar to Lunin's, but not with completed evidence.

It was not until 1912 that a clear-cut picture of the nature of vitamin deficiency was established almost simultaneously by Hopkins in England and Funk in America. Both of these investigators showed the failure of animals to grow on synthetic diets and their prompt cure by the addition of small amounts of extracts of natural foods to the diet. Though Hopkins was given the Nobel prize along with Eijkman for his pioneer work on vitamins, many persons believe that it was Funk who deserves most credit for focusing attention on the possibilities of chemical isolation and identification of the vitamins. For he had obtained a comparatively pure extract of rice polishings, had found that minute amounts could prevent or cure polyneuritis, had identified the substance as an amine (a remarkable coincidence, or an amazingly accurate analysis of an impure substance) and had given the name "vitamine" to the organic bases which he believed were the substances essential for the prevention and cure of scurvy, beri-beri, pellagra, and rickets." The importance of Funk's contribution was immediately recognized, for the name "vitamine" spread rapidly throughout the world, and, though the chemical basis for it was groundless, it remained the accepted name, the *e* being omitted, at the suggestion of Drummond, to avoid the implica-

tion of amine structure.

McCollum, in 1915, clarified the controversial question of the existence of more than one vitamin by demonstrating that both "fat soluble A" and "water soluble B" are necessary for growth. These two substances along with the water soluble anti-scorbutic vitamin extractable from the juice of citrus fruits became the three well known vitamins: Vitamin A, Vitamin B, and Vitamin C. Many other investigators in the years that followed, contributed to the elucidation of the role of these vitamins in the animal economy. Among these may be mentioned Mendel, Osborne, Drummond, Sure, Mellanby, Steinbock, Harris, Goldberger, King, Gyorgyi, Elvehjem, Bills, and Evans. Out of this work came the separation of Vitamin D, the antirachitic vitamin, from Vitamin A, now recognized as the anti-xerophthalmic vitamin, accomplished chiefly by McCollum and his co-workers. Then came the far-reaching researches of Goldberger into the etiology of pellagra, his proof of its being a deficiency disease, and his cure of the disease by administration of the heat stable portion of so-called Vitamin B. Thus the latter vitamin was subdivided. In America, the anti-neuritic vitamin remained Vitamin B and the anti-pellagra vitamin became Vitamin G. The English and European investigators used the name B_1 for the anti-neuritic vitamin and B_2 for the anti-pellagra. The latter nomenclature is almost universally used at present. It soon became apparent that Vitamin B_2 was also a mixture of vitamins. It was shown by Gyorgyi that one of the principal constituents of Vitamin B_2 was a substance isolated sometime previously as lactoflavin and closely related to the yellow enzyme obtained by Warburg from yeast and from animal cells. Gyorgyi further separated a rat dermatitis (acrodynia) factor which he called Vitamin B_6. Elvehjem made the important finding that nicotinic acid (or nicotinic acid amide) was the factor in the B_2 complex which cured pellagra in man or "black tongue" in dogs. The "filtrate factor" of the Vitamin B_2 complex has yielded a substance called pantothenic acid, isolated recently by Williams; and will probably yield new vitamins.

In 1922, Evans announced a vitamin, found in greatest concentration in wheat germ, which prevented abortion in animals. This vitamin he called Vitamin E. Though this contribution was received with a great deal of skepticism at first, it has been amply corroborated and has been found useful in the treatment of chronic abortion in women and also in the treatment of amyotrophic lateral sclerosis and other degenerative nerve diseases.

An important fundamental discovery was made almost simultaneously in 1924 by A. Hess and by Steenbock; namely, that foods rich in certain lipids could be converted by irradiation with ultra-violet light into substances having the same antirachitic qualities as cod liver oil. This observation clarified the role of sunlight in the treatment of rickets and permitted the manufacture of the first synthetic vitamin,—irradiated ergosterol, called by Windaus, actерol or Vitamin D_2, but sold in America under the non-proprietary name of viosterol. This discovery also gave impetus to the new phase of vitamin study, —the isolation, identification, and synthesis of vitamins.

In 1935, Dam of Denmark discovered a new vitamin (Vitamin K), that was concerned with the animal organism's ability to synthesize prothrombin. With the deficiency of this vitamin, clotting is markedly delayed and the tendency to bleeding is great. The previous discovery by Quick that the prothrombin concentration of the blood could be measured quickly by determining the prothrombin clotting time made possible phenomenally rapid progress in the elucidation of the role of this vitamin. It was found to be widely distributed in the common foods, in fact to be synthesized by the normal bacterial flora in the intestine of man. Deficiencies were found, however, in persons with obstructive jaundice who could not absorb the vitamin unless given bile salts, and in newborn infants, who either got too little from their mothers, or, who could not utilize it in their immature liver, or, who had not yet developed a bacterial flora to synthesize it. The therapeutic use of this vitamin has been life-saving in combating hemorrhagic diseases of the newborn and in preventing bleeding during and after operations on patients with obstructive jaundice.

But the last decade has seen the development of two new types of research in vitamins which have taken the field away from the nutritional chemist and placed it in the hands of the organic chemist and the tissue physiologist. These researches comprise: first, the purification, identification and synthesis of the vitamins and the development of new synthetic vitamins with functions similar to the naturally occurring vitamins; and second, the study of the cellular function of the vitamins by metabolic studies of surviving tissue in apparatus of the type invented by

XUM

Warburg and Haldane.

Vitamin C was the first vitamin to be isolated in pure form and to have its chemical formula determined. The isolation was accomplished by King in America in 1932 and almost at the same time by Szent-Gyorgyi of Hungary. Its chemical formula, that of a dehydrogluconic acid, was soon established by Haworth, and its synthesis was achieved both by Haworth and by Reichstein in 1933. The comparative simplicity of the structure of Vitamin C gave a false notion of the structure of other vitamins, which have proved in general to be more complex. One might suspect the vitamins to have complex structures such as only a plant could synthesize, for all the known naturally occurring vitamins, except Vitamin D, seem to have their origin in plants. Indeed it is easy to postulate that these catalytic substances were present when animal evolution began out of plant life, and that their presence thereafter determined the course of tissue and organ development; but that the animals cells never did learn to accomplish such complex syntheses. In the case of Vitamin C, the simplicity of the compound and its close chemical relationship to carbohydrates make one wonder why it must be furnished preformed. The fact is that only the primates and guinea pigs develop Vitamin C deficiency; other animals appear to be able to synthesize the compound.

The identification and synthesis of Vitamin C was followed soon by similar work on members of the Vitamin B group. In 1933, Kuhn, Gyorgyi and Wagner-Jauregg recognized that lactoflavin, a fluorescent substance isolated sometime previously from milk, was a member of the heat-stable group of yeast vitamins used in the treatment of pellagra. It was at first thought to be the true anti-pellagra factor, but this is now known to be erroneous. But it is a vitamin in the true sense of the word. Moreover, the researches of Warburg on oxidation and reduction in the living cell have shown this vitamin (now called riboflavin) to be a necessary part of the yellow enzyme which is involved in dehydrogenating mechanisms in the cell. The chemical structure of riboflavin was established and its synthesis accomplished in 1934. Vitamin B, the anti-beri-beri vitamin, was isolated in 1936 by Williams, after many years of intense investigation. Williams soon determined its chemical formula and achieved its synthesis.

The elucidation of the chemical structure of Vitamin D by Windaus and others is one of the most brilliant phases of modern physiological chemistry. Windaus had first to determine the structure of cholesterol, ergosterol and other related sterols. He and others established the phenanthrene-cyclopentane nucleus as the basic nucleus not only for all the sterols but for cholic acid and for the sex hormones and corticoadrenal hormones. Then the absorption spectra of the sterols in the ultra-violet were determined, and the products obtained by irradiation at wavelengths corresponding to the absorption bands were studied. Windaus succeeded in showing that ergosterol became converted to Vitamin D by virtue of the splitting of the second ring in the phenanthrene part of the molecule and that this was accomplished because ergosterol had two double bonds in this ring. By converting cholesterol into 7-dehydrocholesterol, so that it now had two double bonds in the second ring, Windaus succeeded in making another product with Vitamin D properties. The product obtained from ergosterol he called Vitamin D_2, that from 7-dehydrocholesterol Vitamin D_3. (Vitamin D was the name given to what is now known to have been a mixture of several compounds.) A number of other Vitamin D compounds have been synthesized from other sterol derivatives, in each case by converting the sterol into a compound having two double bonds in the second ring.

The chemical formulae have been determined and successful synthesis made of nicotinic acid by Elvehjem, of Vitamin B_6 by Gyorgyi, of pantothenic acid by Williams, of Vitamin E by Fernholz and by Karrer, of Vitamin A and its carotinoid precursors by Karrer, and of Vitamin K by Dam, by Karrer and by Doisy. At the present moment, therefore, practically all the known vitamins are identified by their chemical structures and most of them are available commercially in pure form.

The study of the role of vitamins in cellular metabolism is still in its earliest stages. The work accomplished already, nevertheless, has not only been of fundamental physiological importance, but gives promise of leading to the solution of some of the most mysterious phenomena of medicine,—namely, that of degeneration of cells and that of the development of cancer.

The most fundamental work in this field of cellular metabolism is undoubtedly that of Warburg. He invented the micro-apparatus which made it possible to study tissue respiration and other chemical

(*Continued on Page* 15)

The Injection Treatment of Hemorrhoids

MANUEL G. SPIESMAN, M. D.

Associate Professor of Proctology, The Chicago Medical School

Almost fifteen years have elapsed since I first began treating hemorrhoids by the injection method. This treatment was little known and seldom used at that time. However, during this period the treatment has grown steadily in popularity until today scarcely a rectal clinic or a proctologist anywhere in the world is not using it. In the United States such men as Terrell of Virginia, Montague of New York, Earley of Denver, Jackson of Fall River, Aaron of Detroit, T. C. Hill of Harvard, Collier F. Martin of Philadelphia, Hirschman of Detroit, Fansler of Minneapolis, Yeoman of New York and many others are successfully using the injection treatment of hemorrhoids.

Strength and Purpose of Solutions Used

The purpose of introducing an irritating solution into a hemorrhoid is to excite a mild chemical inflammation sufficient to produce obliteration. In treating prolapse a similar irritation is set up between the submucosa and the muscularis producing a fibrinous exudate which results in adhesion of the adjoining parts. The solution therefore must be strong enough to excite this mild degree of inflammation and yet not be so strong as to induce a localized necrosis and slough. In the distant past the custom was to use strong solutions and produce chemical necrosis and slough in order to obtain a good result. Necrosis, sloughing, and death occurred too often to make the method safe. The sloughing method has therefore been abandoned and weaker solutions have taken their place. These weaker solutions may require more time and treatment but they are absolutely safe and will accomplish their assigned task.

Terrell uses 5% quinine urea-hydrochloride and reports good results in thousands of cases. The solution used by the writer is 5% phenol in olive oil. Almond oil, Wesson oil, cottonseed oil, and Mazola oil can also be used.

Instruments

The only instruments necessary for the injection treatment are a special Brinkerhoff Speculum, 4 or 6 inches long, a syringe (glass or metal), rustless needles 1½ inches long, gauge No. 24; cotton-swab applicators, and a headlight. Any proctoscope can be used such as the Albright Kelly Proctoscopes, Hirschman's anascopes, Collier's speculum, etc. An advantage of the Brinkerhoff speculum is the reflecting end which inclines inward, reflecting a splendid light on the tissue to be treated; another advantage is the ease with which the Brinkerhoff can be introduced. The 6-inch speculum is used mainly to start the injection of prolapsed mucosa high in the canal. It also finds a valuable place in the treatment of obese patients with large buttocks. The 4-inch speculum is the one most commonly used. Any syringe can be utilized. Each operator usually selects his own, depending upon his individual fancy. Glass luers and metal syringes used by dentists for inducing local anesthesia, such as the "Imperial" or "Mizzy", are satisfactory.

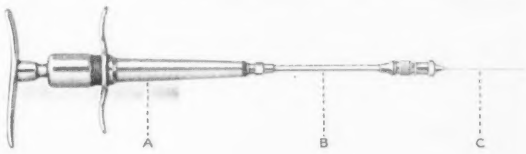


Fig. 1 Mizzy Dental Syringe and No. 24 2-in. Needle

Technic

The patient is placed in any desired position preferred by the operator, such as lithotomy, Sim's, knee-chest, knee-elbow, right or left lateral. The right or left lateral, a modified Sim's, is the most comfortable and least embarrassing to the patient and at the same time affords perfect access to the parts to be treated.

In this preferred position the patient is instructed to draw both knees up toward the chest and the exposed shoulder is turned slightly away from the operator. This further improves the accessibility to the parts to be treated. If the nurse is not present the patient can assist the doctor by raising one cheek of the buttocks.

With the head-light in position the Brinkerhoff speculum is well lubricated and inserted into the rectum. The slide is partially withdrawn bringing the hemorrhoid into view. The speculum is supported with one hand and the injection made with the other.

The hemorrhoid selected for treatment can be

swabbed with a solution of equal parts of iodine and alcohol. The less preparation for this treatment the less the patient is disturbed. Mere cleansing of the mucosal surface through which the injection is to be made by brushing it with cotton or an applicator is usually sufficient. The idea of cleansing cathartics or enemas prior to the treatment is grossly erroneous since both stir up all manner of infective material in the colon, putting it in an aqueous suspension so that it may be easily conveyed to the minute break in the mucosa. The idea is absurd although there

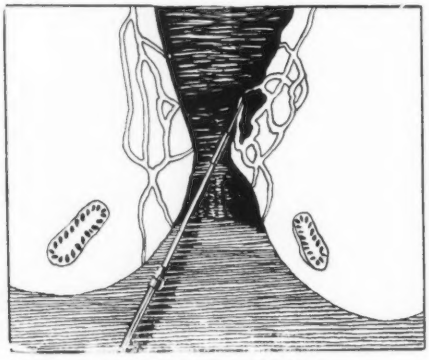


Fig. 2—Correct Technic

are many surgeons who use this as a routine procedure.

Select the hemorrhoid farthest away from the anal verge. The best site for injection is the crest of the pile. Most texts advise that the needle be passed well into the pile mass. Needles are supplied with the overslip guard to enable you to regulate the depth of penetration. This technic is now obsolete amongst the majority of proctologists.

The *new technic* is not to penetrate the pile mass at all, making the overslip guard not necessary. Instead of thrusting the needle into the pile mass it is passed just beneath the mucous membrane at its crest. By making the injection high the solution is expelled slowly until the pile appears distended and somewhat blanched. The needle is held in place for a moment or two and then slowly removed. One to three cubic centimeters is injected into each hemorrhoid. A few drops more or less matters little; experience soon teaches one when to stop. A whitened change in color at the site of injection means that the needle has not been inserted beneath the mucous membrane. Remove and repeat, or thrust the needle deeper and try again. If more of the solution is injected than will be held by the tissue, and some oozes out, no harm will be done. When injected under the mucosa the solution penetrates the whole pile mass with a resulting contraction and restored tonicity of the parts.

Usually two hemorrhoids are injected at one time, or one quadrant is injected at each sitting. If two hemorrhoids are to be injected, select the highest and largest on opposite sides, if possible. Frequently one injection shrinks the smaller and adjoining hemorrhoids as well. It is advisable to inject the bleeding hemorrhoids as early as possible, as patients desire to

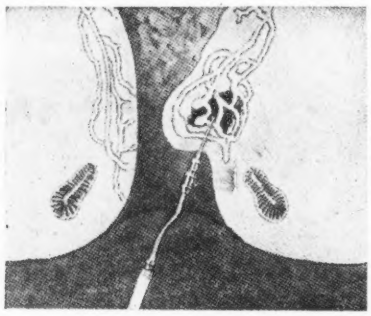


Fig. 3—Incorrect Technic

be relieved of their symptoms. The injections are made from one to three times a week depending on the reaction, and the patient's general condition.

Histo-Pathology Before and After Treatment

A hemorrhoid is a plexus of many small, dilated, valveless veins surrounded by indurated connective tissue and covered by mucous membrane. Injecting an irritant substance around such a plexus will excite a productive inflammation in the adventitia of the vein and in the tissue immediately surrounding it. This results in a gradual phlebitis and peri-phlebitis. The progressive fibrous connective tissue changes that follow induce a steady diminution of the calibre of the vein until complete obliteration results. The venules are no longer distended with blood and as organization proceeds the hemorrhoid is converted into a fibrous mass of tissue. Thus the hemorrhoid, a plexus of small dilated venules distended with blood, becomes converted into a solid non-vascular mass and obliteration is accomplished. In about six weeks the fibrous mass disappears.

Clinical Changes

Clinically these various changes can be noted: within a few hours following an injection an inflammatory reaction is evidenced by swelling and redness. Little if any heat or pain is felt because the inflamma-

tion is mild and the solution is anesthetic, and because the injection is made above the sensory nerve area. In less than 24 hours these changes subside, swelling diminishes, and in a few days the hemorrhoid begins to show evidence of fibrous tissue formation. On palpation a cord-like sclerotic stricture is felt directly under the mucous membrane. Gradually the sclerotic stricture resolves and softens and a restoration of tonicity of the rectal mucosa results. Hemorrhoids which have been bleeding profusely, frequently stop bleeding after the first injection.

Post Injection Reactions

If the proper technic has been used no pain is experienced during or after injections, because the fluid is injected above the area supplied by the sensory nerves. Should any solution accidentally work its way down to the nerve line the most that will be experienced is a dull ache for a few hours. This can easily be relieved by the administration of aspirin gr. v to x. The patient's comfort at all times is of utmost importance. The injection of fluid with distention of the mucosa may at times cause the patient to be conscious of a slight sense of fullness in the rectum. This is only transient, does not interfere with bowel action, and is rarely a source of complaint.

Selection of Cases and "What Not to Do"

Fifteen years experience with the injection treatment of hemorrhoids in several clinics and private practice have taught the writer what to do as well as what not to do, which hemorrhoids to inject, and which do not respond satisfactorily to treatment.

The type of hemorrhoid which responds most satisfactorily to the injection method is the internal one, above the pectinate line. The next most satisfactory is the internal prolapsing type without fibrosis. Hemorrhoids which have prolapsed for years and have become fibrotic do not respond well to the injection method. The strangulated prolapsing pile, the skin tag (integumentary hemorrhoid), and the thrombotic pile should certainly not be injected, but operated. The combined intero-external hemorrhoid with its associated skin tag will not give lasting results if injected.

Some "don'ts" should be strictly observed. Don't inject hemorrhoids in the presence of ano-rectal infections such as cryptitis, fissure-in-ano, fistula, abscess, ulcerative proctitis. Don't inject below the pectinate line. Don't inject into the center of the pile as the solution may enter the circulation. Don't inject beyond visibility as too much solution may be injected with resulting slough and hemorrhage. If a white spot appears, stop, as the solution is being injected into the mucosa instead of below the mucosa. Don't force solutions into any hemorrhoid—solutions must go in with ease; solutions injected under pressure may produce slough and hemorrhage. Don't inject hemorrhoids covered by skin. Don't promise your patient a permanent result, because hemorrhoids can recur, regardless of the method used, surgical or injection.

VITAMINS

(*Continued from Page* 12)

changes. He isolated a number of the enzymes and coenzymes involved in the oxidation processes in the cells, and he formulated the modern theory of chain dehydrogenation involving a large number of intermediate compounds. The picture is still far from complete and there are many controversial features. But the work of Warburg and Szent Gyorgyi in this field, of Meyerhof in the closely related field of carbohydrate metabolism in muscle and other tissues and in yeast, and of numerous other investigators have given the physiological chemist a much deeper insight into cellular metabolism than was possible ten years ago. These investigations have shown that riboflavin is an essential part of the yellow enzyme involved in cellular oxidation, and that nicotinic acid amide is converted into Coenzyme I and II which play a role not only in oxidation directly, but the intermediate phases involving phosphorylation of carbohydrates.

The work of Peters in England on the function of Vitamin B_1 (thiamin) in carbohydrate metabolism is also of fundamental importance. He showed that, in the absence of Vitamin B_1, pyruvic acid accumulated in the body. He and Lohmann were able to show that Vitamin B_1, as a pyrophosphate, was the coenzyme of a decarboxylating enzyme which destroyed pyruvic acid. Thus it appears that beri-beri is due to localized pyruvic acid poisoning of the nerve cells, or due to degenerative changes in these cells produced by the limitation of carbohydrate metabolism upon which they depend so largely.

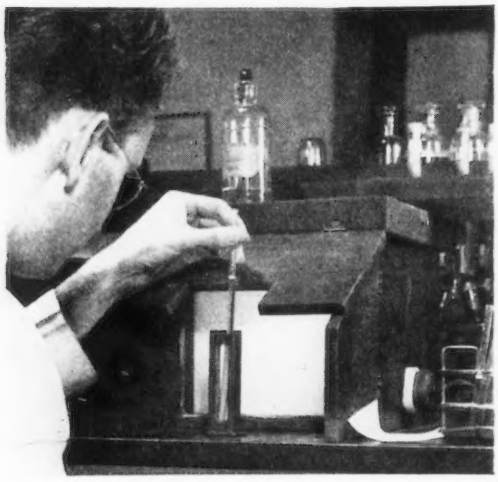
Those who can follow intelligently the researches in the field of the fundamental functions of vitamins may look forward to many future intellectual thrills.

Clinic — Y

IN MEDICINE we try to alleviate pain and delay death, and tend to overlook an accord of bodily parts that is necessary for the patient to become completely cured. The neuroses that we see are great in number. We lack the confidence of the patient because we lack an understanding of him. Towards this end the modern clinic has steadily advanced itself.

In The Chicago Medical School clinic we have two of the most competent, practical sociologists of the field in our admitting room. The management of the patient, plus the establishment of a rapport between the private practioner and the clinic, are the prime considerations of the clinic. To illustrate the complexities of the problems that must be coped with successfully, let us take the case of Mr. Smith and follow him through the door of the clinic entrance.

Mr. Smith has either been sent by a private doctor to the clinic, or he has come on the recommendation of a friendly sympathizer, or on his own initiative after making the necessary inquiries. He is directed to wait for an interview with the admittance officer. He soon finds himself in the presence of a very competent medico-sociologist who is extensively trained in this sort of work. He is asked about his home life, about himself, his social history, financial status, and a multitude of other factors that may be involved. His statements are analyzed, even his mannerisms are taken into account, and finally a conclusion and general impression are arrived at. If there is a past history, this too is used later. If then, in the eyes of the admitting department, it is determined that Mr. Smith is entitled to our facilities, he is accepted. The whole setup is not as arbitrary as it may seem to be. Everything that happens to Mr. Smith from the time he knocks on the clinic door till the time he is formally admitted as a patient, is prescribed and directed by what is often referred to as the "Admittance Bible." This is a very complete series of rules set down in volume form by the American Medical Association and a few other representative social agencies. Generally speaking its theme is clinic efficiency and consideration for the patient. A medical and social face sheet is then prepared for Mr. Smith. It contains a precis of the entire questioning process. Further, an analysis of the interview is made. If he is in dire straits and needs aid, social agencies are contacted. The worker is always on the alert and scrutinizes the social and medical facts with a view toward the recognition of a social problem that may contribute to the medical condition. Psychotherapy may be prescribed by the sociologist. All this is an effort to give Mr. Smith his correct place in the clinic's system. The doctor is to



Routine hemoglobin determination

Urine Analysis

Your Right!

follow up this clinical precursor in an attempt to understand the patient, his complaint, and the concurrent circumstances that go to make up his particular plight. These facts are often sorely neglected.

To sum up we have:

1. The judgment of the eligibility of Mr. Smith as a clinic case, as based on the A.M.A. standards.

2. The collection of social (relief and pensions) and medical history, including the places where previously treated (private practitioner, hospital, or free clinic).

3. The probable diagnosis of the patient's situation:

   a. Medical agencies (and the name of the case worker included).

   b. Social agencies.

   c. Organization of the material obtained in the interview, and placing it on record form as standardized by the A.M.A., American Association of Hospital Social Workers, American Hospital Society, and the Chicago Medical Society.

5. Instruction of the patient as to the function of the clinic.

If we look into these different activities, the clinic looms up on the scene not as a passive instrument for the submission of its patients, but rather as an actively functioning health department, medical center, and social agency. It is an efficient dynamic social machine that is guided by people with a wealth of human understanding, and whose ideal is the alleviation of suffering of the helpless.

Once these preliminaries are over, Mr. Smith finds himself in a simple and efficient medical set-up that will send him out well again as soon as possible. As time goes on, he will be interviewed, and notations made concerning his progress. These notations are filed and held for a round table discussion. He is constantly being viewed with the prospect of his medical and social advancement in mind. Herein we see the importance of keeping accurate medical records of the patient's progress. The possibility is always being entertained that he may yet be sent back to the private practitioner for climaxing the course of his examinations and treatment.

The conduction of the patient in the clinic is prescribed by a volume of rules which are edited by the Economic committee of the Chicago Medical Society in collaboration with a large group of social agencies.

A Wasserman and Kahn test must be done on every patient who enters the clinic. If Mr. Smith is a positive, he is treated coincidentally with the course of treatment for his present complaint. Of necessity, an extensive lecture is given to him on his future conduct at home and at work. He is explained what he has wrong with him, its seriousness, and its medical and social aspects. He is urged to bring in his family for a check-up. With this there may or may not be the intervention of a social agency. If Mr. Smith is dependent upon the government for support, the particular agency involved is called in,

Withdrawal of blood for serological examination

and a close contact is maintained. There is also an understanding established with the city health department concerning Mr. Smith in his course of treatment.

The clinic, gentlemen: those offices downstairs, are alive, and functioning, and striving for the comfort of the patient; that is our common goal. Now the lights are up, the curtain is raised, and we all have our part to play. There is a great cry and demand for our help, a little extra sympathy, a little more understanding, a little more effort towards idealism, and a whole-hearted sincerity.

Traumatic Shock

By H. SLOAN *and* F. B. WARNER

The word "shock" appeared in medical literature as early as 1743 in the translations of work done by LeDran, a French surgeon (1). His observations from extensive experience with gunshot wounds first established the clinical conception of this phenomenon.

About this time Hunter, Woolcomb, Bell and others became aware of shock, as evidenced by mention in their reports of surgical cases.

Since then, this syndrome has become a very important phase of surgery and medicine and has been the subject of much investigation.

Conception of Shock

Primary shock, which occurs on a psychic and neurogenic basis, is to be differentiated from secondary "wound," "surgical," or "traumatic" shock, which occurs hours or even days after injury. Discussion herein will be limited to the latter.

In uncomplicated cases of secondary shock the signs and symptoms present a patient with pallor, cold, clammy skin, fall in blood pressure and body temperature, dilated pupils, rapid and shallow respiration, and a weak, rapid pulse. In such a condition, the patient is apathetic, usually speaks only when spoken to, and lies very still.

In serious cases, the condition is terminal unless successful therapy is administered. The gravity of this condition in some cases is to be considered above the injury itself.

The pathological physiology in this condition involves not only the vasomotor system but also the blood and body cells as well.

Lister (2) in looking at the web of a frog under the microscope, after a blow to the animal, observed a vaso-constriction in both the arterioles and venules. Since cutting of nerves did not prevent the vaso-constriction, he considered that other factors acting locally on the blood vessels were at least in part responsible. Vaso-constriction was likewise found to occur in the liver, lungs, heart, and kidneys. Today it is a very well established fact that constriction of both arterioles and venules are involved in the shock reaction.

Concomitant with this, there was shown experimentally that a tetanic condition of the heart was present and that the cardiac output was diminished by this fact itself (3, 4). Consequent to these factors, there is a trapping of blood in the capillary bed so that there is a congestion and an increase in capillary volume (5, 6).

The result indicates a reduction in volume flow (7) and a decrease in circulating blood volume. This dilatation, Dale and Laidlaw (8) stated, was due to the action of histamine. However, Krogh (9) attributed this dilatation to a lack of a certain unknown substance in the blood, since when capillary flow was resumed it tended to disappear.

With stagnation in the capillaries, an accumulation of metabolites and carbon dioxide takes place, increasing the capillary permeability resulting in the fluid portion of the plasma going out into the tissues and viscera. Supporting this evidence Morrison and Hooker (10) found the volume of an intestinal loop to be increased in shock. As the blood becomes dehydrated, the viscosity increases, also contributing to the slowing down of the return flow to the heart.

The decreased rate and volume flow of venous return plus the spasm of the heart muscle result in a decrease in cardiac output, or, in other words, an oligemia and thus a fall in blood pressure. Johnson (11) reports that with a systolic pressure of 80 millimeters of mercury, the cardiac output is one-third of its original volume.

The fall in blood pressure causes an ischemia to the vital medullary centers of the brain and causes death through paralysis of the respiratory centres.

Certain definite physical and chemical changes occur in the blood itself, since there is a stagnation in the peripheral vessels from increased viscosity, inspissation into the tissues, and toxic products from the traumatized area.

Vale (12), repeating experiments of previous investigators, showed that in shock from either surgical operations or trauma, the blood showed a rise in specific gravity while the tissues gained fluids. This rise occurs hours before an actual fall in blood pressure and is a very accurate and definite indication of impending shock (13). In this manner, early therapy may be instituted before the actual fall in blood pressure occurs (14).

There is now a very accurate and convenient method for measuring specific gravity of blood. By

using Stoke's Law, a falling drop of known volume, traveling a definite distance, is timed through an immiscible fluid (15). It is twenty-five times more accurate for measuring a hemo-concentration than is an average blood count (16).

Another method of measuring hemo-concentration is by means of an hematocrit. By this means, the percentage increase in the cells of the blood is determined (15). The procedure, in brief, is putting a sample of venous blood in a graduated tube containing a milligram of heparin. The tube is corked and centrifuged for an hour at 2500 revolutions per minute. At the end of the hour the cells are at the bottom and the plasma at the top of the tube. By reading off the levels of the total and also of the cells, a percentage is calculated (15). Both of these methods are used to determine clinically the presence of impending shock.

In shock, Asiatic Cholera, adrenal insufficiency and acute intestinal obstruction, the blood changes are very similar (15). Patients suffering from any one of these conditions have a severe state of dehydration which easily explains the rise per volume in total solids, hemoglobin, and specific gravity of the blood stream. Electrolytic changes in anions and cations are similarly effected, among which potassium increase in the plasma has received considerable attention by Scudder and others (15). There is also a rise in N.P.N., creatinine, and hydrogen ion concentration.

Theories of the Etiology of Traumatic Shock

The number of theories of shock is almost as great as the number of those attempting to find the explanation of this common phenomenom. A brief discussion of the more recent theories concerning this as yet unsolved problem is not out of place.

1. *The Exhaustion Theory*: This theory, fostered by Crile (17), was based on the hypothesis that excessive painful stimuli, which resulted from trauma, eventually led to the exhaustion of the vasomotor centers in the cord and medulla, which in turn led to arterial relaxation and shock.

Porter (18) brought out the fact, however, that continued stimulation of sensory nerve fibers did not produce shock, and that vasomotor activity is neither exhausted nor inhibited in shock. In fact, Erlanger (19) found an increased compensatory vasomotor activity during the first few hours of shock, which decreased only after the blood pressure had become so low as to cause an anoxemia of the vasomotor centers.

2. *Acapnia Theory*: Henderson (20) noticed that in shock there is a decrease in the output of arterial blood, due to a decrease in the venous return. He put forth the theory that there is a venopressor center which is controlled by the amount of carbon dioxide in the venous blood and controls the venous return, and that painful stimuli and emotion causes an abnormal decrease in carbon dioxide (acapnia). This, in turn, causes a decrease in the venous return and results in shock.

Janeway and Ewing (21), Wiggers (22) and Mann (23) were unable, however, to either produce shock by hyper-ventilation or to prevent shock by supplying an excess of carbon dioxide.

3. *Fat Embolism Theory*: It had been noticed by many that most of the symptoms of traumatic lipemia were common with those of shock. However, Moon (24) and his associates produced shock in such a manner as to prevent the entry of fat into the blood stream.

4. *Traumatic Toxemia Theory*: This theory is most often connected with W. B. Cannon's name due to the great amount of work that he did along these lines (25, 26, 27, 28, 29, 30,). The first World War presented the first real opportunity to study shock under a multitude of conditions. It was then observed that shock most frequently developed in those types of injuries where there were extensive involvement of the deep, soft tissues. In these cases, circulatory failure manifested itself not immediately but appeared from four to twenty-four hours later. It was also observed that when tourniquets which had been applied on the field of action were later removed, shock ensued. This led to many instances of amputation with the tourniquet left on. This type of amputation was not complicated by shock, and in many instances amputation was resorted to as a prophylactic measure. These facts indicated the absorption of some toxic product from the injured area which resulted in shock.

Dale and Laidlaw (8, 31, 32, 33, 34) had previously noted that histamine produced a fall in blood pressure, decrease in blood volume, and hemo concentration. Noting the similarity of the effects of histamine to shock, they suggested that the symptoms of shock were due to the absorption of a histamine like substance from the injured area.

The experiments of Cannon and Bayliss (30) added emphasis to the traumatic toxemia theory.

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Working on dogs, they ligated the blood supply to an extremity. They then traumatized the extremity. As long as the ligature remained in place, the blood pressure of the animal remained normal. When the ligature was removed, shock followed.

It was shown by Moon and Kennedy (24) and others, that shock could be produced by watery extracts of almost any tissue when injected intravenously, or merely by placing a piece of muscle into the peritoneal cavity of a dog.

Lewis (35) suggested that histamine-like or "H-substances" once liberated from the injured area caused a dilation of the splanchnic capillaries permitting stasis, and in that way, caused the symptoms of shock.

On the other hand, Dragstedt and Mead (36) showed that the blood of animals in shock had no vasodepressant effect on normal animals.

5. *Fluid Loss Theory*: Blalock (37, 38, 39. 40) and later Parson and Phemister (41) and others noted that if shock were produced in an animal by trauma, and if, after death, the extremities were carefully dissected and separated from the body, the injured extremity was found to be heavier due to an increased fluid content. Shock was attributed to a loss of fluid into the traumatized area.

6. *Moon's Theory*: Moon (42), in an interesting and exhaustive article, views shock as the result of a vicious cycle. He believes that the cycle is started as a capillary atony, which can be caused by the absorption of toxic factors from the injured area and the numerous factors concerned with shock production. This atony results in capillary dilation, stasis, and increased capillary permeability. This, in turn, leads to a decreased blood volume which, in turn, causes a tissue anoxia. This tissue anoxia increases the capillary atony, and the cycle is now in operation. This cycle becomes evident only after the compensatory mechanisms of vasoconstriction begin to fail. The tissue anoxia, however, leads to a deficient oxidation which results in acidosis. The acidosis causes a defective metabolism, which also causes capillary atony. This concept brings out the important idea that the "shock cycle" is augmented not only by local tissue changes but also by metabolic changes.

7. *Neurogenic Theory*: Slome and O'Shaughnessy (43) found that blocking afferent nervous pathways from the injured area delayed the onset of shock, and more recently, Lorber (44) produced shock in a dog whose only connections with the traumatized extremity were nerves.

It is to be emphasized at this point that the riddle of surgical shock is as yet unsolved. Each day brings evidence of new factors that play a part in its production. Schachter and Huntington (45) found that it was easier to put dogs into shock that had been on a thyroid diet, than those that had not received any thyroid. Meakins (46) and other workers are obtaining improvement in shock therapy by the use of extracts of the adrenal gland, the thymus gland, or both. The problem of etiology is still unsolved.

Treatment of Traumatic Shock

The treatment of shock is both symptomatic and physiologic. No one means of therapy or any combination assures the patient's recovery. The prophylaxis whenever possible therefore assumes a greater importance than if there were an entirely successful means of combating this condition.

In the first World War, shock occurrences were 20% higher in winter than in summer. The metabolic rate was also found to be lower in shock (47). Chassat (48) showed the importance of heat by experimentally starving doves and thereby lowering body temperature. The beneficial effect of the application of external heat enabled them both to stand and fly. This and other evidence has shown the value of heat therapy (49). Since vasoconstriction is seen in shock, heat tends to lessen this by vasodilatation, besides restoring body heat. For the same reason warm fluids are advocated, aside from the replacement factor in fluid loss.

The importance of fluids was realized in 1723, when they were administered anally as clysters. Later saline fluids were used intravenously in the treatment of Asiatic cholera to combat the severe dehydration. The successful experimental results of alkaline saline on dogs (50) led to its use for the same things in humans. Lane (51) also pointed out its value in the prophylaxis of shock. Later the use of hypertonic saline of 1.5% was considered efficacious. Rogers (52) believed normal saline contained insufficient sodium chloride to be of as great a value as hypertonic saline. Later, in 1917, Bainbridge and Treven (53) suggested its use in shock therapy.

In 1918, Bayliss (54) introduced gum acacia as a treatment after experimentation on animals. The rationale of this treatment was to raise the osmotic pressure of the blood stream, thereby drawing the fluid from the tissues back into the blood stream and

thus increasing the blood volume which had become depleted in shock. However, objections were raised against its use because of the possibility of thrombosis (55) in the liver and pulmonary vessels. There was also evidence of an increased hemolysis and an increased blood viscosity. Experiments on animals showed only a temporary rise in blood pressure, and the animals later died.

Schwarz (50) concluded that better results were obtained if sodium bicarbonate were added to the saline administered intravenously. Howell proved this beneficial effect was through the direct effect on the heart (56).

The beneficial effect of the sodium ion is twofold. Roy (57) has found that sodium salts relaxed the constricted blood vessels, and Conheim found that with hypertonic saline the blood dilution due to its administration reduced its frictional resistance and thereby produced an increase in the velocity of blood flow.

The maintenance of an adequate amount of fluid is very important since there is an excess of fluid loss through diarrhea, emesis, sweating, and over-ventilation which often accompany shock (58).

After Landsteiner's discovery of blood types, the administration of blood transfusions became very popular during the first World War (59). Later, preserved blood was introduced but was not advocated as widely because of certain deleterious chemical changes. One objection to blood transfusion is that since there is a hemo-concentration, the addition of more red blood corpuscles through a transfusion increases further the hemo-concentration, producing more of a congestion in the capillaries, increase in the blood viscosity, and ultimately tends to defeat its own purpose.

Since then the use of preserved and concentrated plasma (46) has been indicated with the purpose of replacing the fluid loss and restoring the osmotic pressure of the blood stream. Beard, in 1931 (60) stated that loss of plasma protein was the most important factor in shock.

Experimental results show a decrease in the normal amount of oxygen. This causes an acidosis (54) and has a deleterious effect on the nerve cells. Since the circulation is slowed down in shock and a local anoxemia in the capillary areas is produced along with electrolytic changes, the administration of oxygen will help.

The removal of as much injured tissue as possible has long been recognized as a prophylactic measure (61). Thus an amputation of a crushed member or as extensive a debridement as possible has been advocated. For the same reason the removal of a tourniquet from a crushed limb is not recommended if amputation is anticipated (62).

Since pain itself causes a vasoconstriction, its elimination or suppression must be regarded as a method of prevention.

Crile (63, 64) by the use of a nerve block for painful stimuli and Mummery, (65) by the use of cocaine, demonstrated the value of this means of prophylaxis. Narcotics and sedatives serve as the chief pain depressors. Along with this might be mentioned that the patient should be placed in the most comfortable position possible, according to the injury, and the bed should be in Trendelenburg position to increase cephalic flow.

Oliver and Schafer (66) and also Crile (67) employed adrenalin for shock. It was used extensively for a time, but fell into some disrepute when shock was produced by repeated injections of it. Later however, adrenal cortical extract was found to be of value. Cases of adrenal insufficiency, with very much the same blood picture as that found in shock, were found to respond very readily to cortical extract, and it was later found to be of value in shock itself.

This cortical extract has a beneficial effect in the restoration of blood volume (68), raising of blood pressure (69) and lowering the blood viscosity and concentration (70). Besides this, it combats acidosis by aiding in the retention of bases and helping normal kidney function.

Insulin has been found to lower the blood potassium (71) besides maintaining more of the base in the blood and has on this assumption been used occasionally in shock therapy.

In the present machine age and period of large scale wars, the incidence of secondary traumatic shock assumes an even more important phase of medicine and surgery.

Just why and how this shock reaction occurs, especially in cases where the injury seems insufficient to warrant it, is a problem for much further investigation.

Editor's Note: The numbers refer to the bibliography. The excellent list of refernces which the authors used involves 71 articles. This list is available upon request.

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The Country Doctor

The romance of medicine is deeply embedded in the practice of the country doctor. The picturesque impression of one of the oldsters, driving through a blinding snowstorm with a Loeffler culture pressed close to his breast, is one that we always carry with us. These men who practice in the small towns and outlying districts are as much the pioneers of science as the laboratory research worker. They bring the best that science has to offer to people who still live back on the good earth. Here we have men with ideals towards which they strive unrelentlessly, and here also we find people whose appreciation doesn't end when the bill is paid. The doctor's job doesn't end when the fever goes away; he is a guiding spirit in recuperation and in health as well.

Practice in the country is always a dramatic affair to us here in the larger cities. No matter where our minds may choose to stop in a consideration of the country doctor's daily routine, we are always offered room for speculation. In his home we can very easily build up the picture of a dusty microscope, a few scattered test tubes, and a pair of squealing mice in an old decrepit cage in one corner of the room. Somewhere in his basement we would find a home-made table, a scale, a shelf of drug extracts, snow-white filter paper, and a single bright light that contrasts the dismal aspects of the rest of the room. Upstairs there is the warmth of a kitchen wherein a hundred lives are discussed daily with a usually very competent wife.

Out there a name never becomes a number; the doctor worries about Farmer Jones, Mrs. Jones, their children, and the cattle as well. Out of his home and in the town social circles he takes his place as a chief executive in almost every move. At the general store, again he is at home by the old black chimney stove; telling stories with the best of them, and talking of a new sewage disposal system for the town, or a new first aid station, or for the organization of welfare work for the few needy ones. He is doing a great job in the backward communities; from infantile colic to the brown atrophy of old age, he is always working. He helps them into the world and through life; and then he watches them go. When we retrospect on the limitations of this practitioner, with all the handicaps he has to face; limitations of facilities,—time for all this work, and all the technical and mechanical obstacles, it makes us wonder.

Down among the coal fields of southern Illinois we can easily find the extreme in manner of impediments. As we walk along the streets of one of these old mining towns we're srtuck by the stench of stagnant garbage, putrefying waste; cesspools pregnant with filth and disease. Delete ignorance! Fight the Konioses, watch for gas in the mines, and combat all the contingencies of poverty! Those are the problems here. The doctor has to examine, diagnose, prescribe, and prepare his drugs as well. It's all a great paradox, and far from the Doctor Kildare medicine to which we are exposed here.

Down there the city specialist is a ridiculous

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The Public Health Aspects of Tuberculin Surveys

By I. S. NEIMAN, Ph.D., M.D.

It seems more or less fitting in writing on so limited a topic to dwell somwehat on historical and elementary considerations. Tuberculin was prepared first by Robert Koch and was shown to be an extract of the tubercle bacillus which when injected into the skin of an animal with tuberculosis, latent or active, resulted in a local reaction about the site of injection. He also demonstrated that it stimulated a reaction about the lesion, wherever it might be, and it was this observation which led him to recommend tuberculin for therapeutic purposes. The tragic results of this premature exposition of Koch's observations are today well known and are easily understood on the basis of our knowledge of allergy of infection. We are not interested here in the therapeutic value of tuberculin; suffice it to say that it is still used in certain quarters but is of doubtful value.

Tuberculin, as prepared by Koch, is now referred to as Old Tuberculin or O. T. to differentiate it from some fifty varieties of tuberculin which have been used at one time or another. O. T. is prepared by growing human tubercle bacilli on a broth medium containing glycerine. After six to eight weeks in the incubator the culture is filtered and the filtrate concentrated to one-tenth its original volume over a water bath. This concentrate is O. T. It has been arbitrarily stated that one cubic centimeter of the concentrate contains 1000 milligrams or one gram of O. T.

Chemical analyses of tuberculin have yielded the information that the active principle in O. T. is a protein substance of undetermined value which is problematically antigenic. On the basis of this knowledge it has been possible to precipitate the protein from O. T. and thus eliminate some of the impurities, by the use of trichloracetic acid and ultrafiltration. The resulting substance is popularly known as P.P.D. or Purified Protein Derivative. This material is approximately five to ten times as active as O. T.

The technic of the tuberculin test varies in different areas and laboratories. The most popular and probably the most sensitive is the intradermal injection of 0.1 cc of an appropriate dilution. This is known as the Mantoux test. The other technics are concerned with the use of undiluted O. T. applied to the skin by scratching (von Pirquet), by a patch of adhesive to which has been attached a square of gauze treated with O. T. (Vollmer) and an ointment containing O. T. (Wolff). There exists a large number of studies undertaken to compare the sensitivity of these tests. It has been established fairly well that the Mantoux is the most sensitive, giving approximately 15-20% more positive results than the von Pirquet. The patch test has come in for a good deal of study recently with the very important result that when it is positive the Mantoux is positive and therefore it is necessary to Mantoux only the patch negative individuals.

If we look into text books of older vintage than the fourth decade of the twentieth century, we find that tuberculin surveys of certain populations led to the conclusion that 85% to 95% of the adult population gave positive tuberculin reactions. This carries with it the implication that most of the adult population have tuberculous infection either latent or active, mostly latent fortunately. In the last twenty years tuberculin surveys have been much in vogue and an abundance of evidence has been accumulated that "tuberculization" is not as general as has been supposed but varies from place to place and with various age groups. It has been shown that the incidence of tuberculin reaction increases with age, is larger in urban than in rural communities, and is greater in groups of individuals more liable to be exposed to tuberculosis, such as medical students and nurses, than in individuals less liable to be exposed such as college students. It has also been shown that in the general population here has been a definite decrease in the percentage of people reacting to tuberculin.

Observations of this nature are helpful to the public health officials from several points of view. Firstly, it means that as individuals grow older from infancy to adulthood they run a progressively greater risk of acquiring a tuberculous infection. This is explained by the greater range of contact with society acquired with advancing age. Secondly, it means that in crowded communities such as cities, there are greater opportunties for exposure to tuberculosis than in rural centers. Thirdly, it means that tuberculosis

is a contagious disease since most people are more or less susceptible and will acquire infection if sufficiently exposed as evidenced by statistics on medical students and nurses. In these latter groups it has been shown that there is close to 100% infection upon completion of study as compared to very little change in incidence of tuberculin reaction among college students on completion of four years study.

Recent tuberculin surveys have led to the observation that individuals once reacting positive to tuberculin may at a future date lose this reactivity. This is in direct contradiction to a former conception that once an individual is positive to tuberculin he remains so throughout life. The significance of this finding is of controversial nature at present but according to E. R. Long probably means that persons are infected, develop lesions which heal completely to the extent of loss of allergy of infection and then become reinfected from an exogenous source.

Possibly the greatest value of tuberculin surveys lies in repeated testing of the same group at regular intervals. This gives to the tuberculin test its most important diagnostic value; it points out just when an individual acquires disease and gives a logical reason for a chest roentgenogram of an otherwise healthy individual. It is for this reason that routine annual tuberculin testing has been instituted in most medical and nursing schools and some of the universities. The technic is to tuberculin test all entering students, at the same time procuring chest roentgenograms; those that are positive to tuberculin on initial examination should be X-rayed annually. Those that are negative to tuberculin should be retested annually and another chest film taken when a positive test occurs. Such a program is to be specially recommended for medical students since they constitute a special risk group. This becomes apparent if we bear in mind the fact that a positive tuberculin test means tuberculous infection. Thus, in a recent survey of the students at The Chicago Medical School, 75.8% of the Freshmen, 76.8% of the Sophomores, 91.0% of the Juniors and 95.2% of the Seniors were found to react to tuberculin.

On the basis of the foregoing it appears that tuberculin surveys have a great deal of value as indicators of tuberculous infection in the population under study. However, individuals will remain individuals and the questions invariably arise as to the significance of a positive tuberculin reaction and as to the desirability of being either positive or negative.

A positive tuberculin reaction signifies but one thing, the presence of tuberculous infection. However, the presence of tuberculous infection means the presence of the only kind of resistance we know to tuberculosis, superinfection immunity. In other words, one may think of a tuberculin positive individual, as one who has been "naturally" vaccinated. But this "natural" vaccination carries with it a certain disadvantage; namely, the more or less healed tuberculous lesion may, given the proper conditions of lowered host resistance, break down leading to an endogenous infection.

The proof of the pudding, or words to that effect—the only way to find out whether or not the advantages of a positive tuberculin reaction overweigh the disadvantages, is to compare the incidence of clinical tuberculosis in initially positive and initially negative reactors. This has been done in a number of nursing schools with the result that clinical disease occurs three to four times as frequently in nurses who did not react to tuberculin on entrance to training than in those who did.

It seems perfectly obvious that the ideal state is a negative tuberculin reaction since this implies freedom from tuberculous infection. The only difficulty in such a situation is to provide an environment such that a negative individual will remain so. This is wellnigh impossible for medical students.

In conclusion it may be pointed out that tuberculin surveys serve two main purposes:

1. They provide a more or less accurate index of the prevalence of tuberculous disease in any given population.

2. They provide a means of detecting early clinical disease by roentgenogram where objective physical examination and subjective findings are of negative value.

Willis' account of Diabetes Mellitus in his Pharmaceutica Rationales or an Exercitation of Medicines in Human Bodies is entitled "Of the Too Much Evacuation by Urine and its Remedy, and Especially of the Diabetes or Pissing Evil . . ."

* * *

Rumor has it that the very vivid description of the plague described by Boccacio, which earned for him the title "The Father of Italian Prose" was only a product of his imagination and obtained from hearsay. At the time of the plague the old boy was in Naples. The plague, as it occurred, was in Florence.

Tuberculosis and Genius

LeRoy P. Levitt

The psychopathology of genius is one of the most fascinating and illuminating studies in Medicine, especially in relation to tuberculosis. Even though the records are vague, and the clinical histories are far from analytical, the diaries and correspondence of a few men of genius have given an amazing clinical picture of the psycho-pathology of this, the "White Plague".

One very pertinent and absorbing question inevitably arises in the attempted correlation of tuberculosis and genius. Did these people of unquestioned brilliance accomplish their work in spite of the deadly malady which sapped their physical powers? Or is it possible that the disease itself played some part in the attainment of their intellectual greatness, and that the toxin of tuberculosis actually stimulated and aided in their productions?

There is indeed a great deal to be said in support of the latter view as some of the later cases will show. But, although the roll of women and men of genius who have been the victims of this disease is a lengthy and exalted one, embracing some of the greatest names in music, art, and literature, it is only natural to say that many more gifted figures have never shown a trace of this scourge.

It must be understood that there is no basis for saying that the fire of tuberculosis has the energy to transform mediocrity into genius. Yet it is a well known fact that the toxin of tuberculosis does produce a mild form of intoxication or stimulation of the cerebral functions. There is ample evidence therefore that in some cases presence of the malady has strengthened and not weakened the forces of genius.

Though in many instances definite clinical history is lacking, in certain outstanding individuals, such as Robert Louis Stevenson and John Addington Symonds, their self-analytical writings have both furnished an accurate and a vivid picture of the course of tuberculosis in respect to themselves. In nearly every case there has been an antecedent family history of tuberculosis, and a very definite neuropathic tendency. Also, another point of note is that in such definite details that are available, great variability and change in the incidence and type of the disease are noted. Keats and Beardsley seem to have had a rapidly caseating hemorrhagic form, while the evidence intimates that De Quincey and Ruskin were afflicted with the fibroid variety.

In the *Confessions of an Opium Eater*, De Quincey himself states that his father died of consumption at the age of thirty-nine and then goes on to describe his own symptoms of "the hectic colors in the face, the nocturnal perspiration, the growing embarrassment of the respiration and other expressions of growing feebleness; all these symptoms were steadily accumulating between the ages of twenty-two and twenty-nine."

John Ruskin, another notable example, is said to have written his "Modern Painters", and "Seven Lamps of Architecture" during the active phase of the disease. Among the authorities, there is little doubt that Francis Thompson did his most inspired work when the disease began to reassert itself, after a lapse of time when Thompson was under the effect of opium, a common recourse at that time

Ralph Waldo Emerson's persistent ill-health, to which he so frequently refers, in the absence of another explanation, suggests the presence of a tuberculous toxemia, in view of the fact that his father died from a "consuming marasmus", and his brother, Edward, died of tuberculosis. Goethe refers often to his condition of hemoptysis, of which he suffered in early youth and then at sporadic intervals in his later life; and although he lived to the age of eighty-three indications point to a latent case of the disease.

Schiller's biographer comments that " . . . tuberculosis served in some way to increase activity and fan his intellect into a keener flame." "His life was a kind of fever," wrote Farjeon, and he produced his finest work when his health was gone.

Matthew Arnold wrote of Maurice de Guerin, a poet of rare genius, " . . . the talent itself is deeply influenced by the mysterious malady". Although he is said to have died of nephritis, Honor de Balzac appears also to have suffered from pulmonary tuberculosis, as implied by his diary.

These are a few of the illustrious victims of tuberculosis, but to mention the names of others is an easy task. In the field of music are found Chopin and Mozart; representative in philosophy are Calvin and Voltaire; Lord Nelson and John Paul Jones in

(*Continued on Page* 30)

The Medical Student and His Social Aspects

E. FLICK

For some time, prominent leaders in the field of medical education and a few interested sociologists and religious administrators have been very much concerned with the problems of medical students. The various aspects of the investigations are exceedingly complicated and not readily reduced to single terms. In a very broad sense, the problems of medical students are essentially those of youth in general. More particularly, however, those problems peculiar to medical students may be said to originate from a set of circumstances whereby men of mature age and high aspirations are compelled to live only a sort of half existence in the social structure.

Modern medical education, while putting a premium on rigorous scientific discipline, tends to stunt the cultural development of the student. Moreover, the dogmatic method of the laboratory seems to carry with it the seed of cynicism toward moral and religious values which the young practioner must appreciate. No longer is he dealing with test-tube reactions and anatomical specimens. He is facing the problem of treating men and women sick in mind as well as in body. Therefore, in this questionaire, a deeper insight into the attitudes and reactions of medical students in relation to the social structure can be derived.

In order to crystallize some of these basic problems, two surveys have been conducted with more than thirty-five hundred medical students in the Chicago Area. The particular forms used, evolved only after intensive questioning of interested students and faculty members, were finally drafted by the students themselves. A good part of the work, distributing samples and compiling the results was relegated to the students. The conclusions were presented in articles that aroused wide-spread interest in the profession. The 1940 survey, reproduced below, with the author's kind permission was taken from the reprint of a paper by Norman A. Fielder, Program Director at the Professional Y.M.C.A.

1. *Q.*—Do you feel that you personally are in need of more cultural training and background to equip you for the practice of your profession? *A.*—Yes 63%, no 37%.

2. *Q.*—Do you use alcohol? *A.*—Moderately 70%, not at all 20%, excessively 10%.

3. *Q.*—Which of the following have you attended more than three times during the school year? *A.*—Opera 3%, plays 6%, movies 25%, church 10%, concerts 9%, athletic activities 17%, read nontechnical books 17%, night clubs 9%, taverns 9%, burlesque shows 1%, gambling joints 2%.

4. *Q.*—How do you prefer to attend these? *A.*—Alone 14%, with your own sex 30%, with the opposite sex 56%.

5. *Q.*—Do you intend to specialize in a branch of your profession which requires further study after you have completed your present course? *A.*—Yes 53%, no 47%.

7. *Q.*—Roughly what percentage of your courses do you consider time wasted ? *A.*—25%.

8. *Q.*—Does the curriculum leave you enough time for social interaction and enough leisure to pursue other interests? *A.*—Yes 59%, no 41%.

9. *Q.*—Roughly what percentage of your instructors do you consider good teachers? *A.*—50%.

10. *Q.*—Do you depend on religion for personal satisfaction? *A.*—Yes 37%, no 63%

11. *Q.*—How do you attend church or religious meetings? *A.*—Regularly 7%, occasionally 10%, never 83%, *Q.*—If you do not attend regularly why? *A.*—Work 10%, sleep 75%, indifference 15%, fear of ridicule 0%.

12. *Q.*—Since entering professional training, how has your regard changed toward the church? *A.*—Greater belief 30%, less belief 70%.

13. *Q.*—Regardless of financial status of the student at what time during his training is marriage advisable? *A.*—First two years, 18% last two years 25%, internship 27%, "starvation period" 30%.

14. *Q.*—Compared with your intellectual level, what sort of person would you prefer to marry? *A.*—Below 0%, even with 74%, above 26%.

15. *Q.*—Do you approve of women physicians? *A.*—Yes 27%, no 73%, *Q.*—If any of your family were ill, would you call a woman physician? *A.*—Yes 38%, no 62%.

16. *Q.*—Do you approve of girls sharing expenses on dates? *A.*—Yes 76%, no 24%.

17. *Q.*—In a word, what do you regard as the most undesirable characteristic in students of your

school? *A.*—First selfishness, second egotism, third rudeness, fourth cheating.

18. *Q.*—Have you ever had venereal disease? *A.*—Yes 3%, no 97%, *Q.*—Indulged in sexual intercourse when engaged? *A.*—Yes 72%, no 28%.

19. *Q.*—Do you use contraceptives personally? *A.*—Yes 85%, no 15%. *Q.*—Do you think the doctor should be trained to give this information? *A.*—Yes 97%, no 3%.

20. *Q.*—Where do you plan to practice? *A.*—In a large city 79%, small community 21%.

21. *Q.*—How is your physical condition and health as compared to how it was when you entered the professional school? *A.*—Same 65%, worse 35%.

23. *Q.*—Do you understand the Wagner bill? *A.*—Yes 46%, no 54%.

24. *Q.*—If the United States declared war for any reason would you volunteer for military service? *A.*—Yes 25%, no 75%.

25. *Q.*—Are the students in dentistry, medicine, pharmacy and nursing professions more careless than the average in dress? *A.*—Yes 57%, no 43%.

26. *Q.*—Is a professional student justified in accepting financial support from his wife? *A.*—Yes 72%, no 28%.

27. *Q.*—Do you feel that your profession has has hardened you to human need? *A.*—Yes 36%, no 64%.

28. *Q.*—Do you favor some college training for admission to nursing school? *A.*—Yes 100%. *Q.*—If so, how many years? *A.*—Average two years. *Q.*—To dental school? *A.*—Two years. *Q.*—To pharmacy school? *A.*—Two years.

29. *Q.*—During your professional training how has your belief in a personal god become? *A.*—More important 32%, less important 68%.

30. *Q.*—Do you consider your professional school colleagues adequately schooled in etiquette? *A.*—Yes 40%, no 60%.

31. *Q.*—Do you feel that your professional training tends to make you humble? *A.*—Yes 30%, no 70%.

32. *Q.*—Are you influenced by propaganda? *A.*—Yes 54%, no 46%.

33. *Q.*—Do you believe in regimentation of your profession? *A.*—Yes 3%, no 97%.

34. *Q.*—Do you favor your school establishing certain standards for living conditions? *A.*—Yes 52%, no 48%.

Medical Tidbits

From Major's Classic Descriptions of Disease, 2nd Edition. Courtesy of Charles C. Thomas, Publisher, Springfield, Ill.

R. F. Graves, of Graves' Disease, was much opposed to the low caloric diets in vogue during his time (1835) for the treatment of typhoid and other fevers. One day while passing through the hospital wards, he was struck by the splendid appearance of a patient who was recovering from typhoid fever. "This is all the effect of our good feeding," he exclaimed, "and lest, when I am gone, you may be at loss for an epitaph for me, let me give you one in three words HE FED FEVERS!"

On a tombsone in a Dublin graveyard can be seen the following words, "HE FED FEVERS!"

* * *

Pierre Bretouneau of French medical fame and of a family seething with physicians, surgeons, and apothecaries, wrote that the great intrinsic value of a man is "neither what he has, what he knows, nor his talents; it is his character. "Profits are perhaps legitimate for business men, for men of affairs; but I am convinced that they degrade the character of a physician."

* * *

114 years ago, Laennec's first stethoscope was made of a roll of paper. He later streamlined this instrument by substituting a cylinder of wood. Some modern medical schools are contemplating a course in mechanical engineering to instruct students in the art of attaching some of these up-to-date chest pieces.

* * *

Fracastorius might have been the first to recognize in contagium the importance of particles as infecting agents, but just so that we don't forget him, he wrote a poem, telling a legend of a Shepherd named Syphilis who, for getting out of hand with the gods in power at that time, was punished by being adorned with a disease that now bears his name.

* * *

Primitive tribes in South America perform Caesarian operations. For maintaining incision closure until healed, large ants with strong pincer-like jaws are made to bite into the incision edges and the body of the ant is then cut from its head, leaving this modified clip in place.

* * *

In Britain, syphilis is sometimes referred to as the "American Disease." (Interventionists take note).

XUM

The March of Progress

H. A. SMITH, M. D., *President of Alumni Association*

The really fortunate circumstances in our lives are generally of our own production. If this be true for individuals, it must also be true of institutions. If it is true of fortunate circumstances, it is also true of unfortunate circumstances. The principle is the same in any case.

The past history of the efforts to maintain The Chicago Medical School as an institution of medical learning has proved the correctness of the principle expressed in the above statements. Recent history reveals to us that our Alma Mater is facing more and more of the fortunate circumstances; and the unfortunate are rapidly becoming past history.

Those who have had the pleasure of observing closely the progress of our school have noted with considerable satisfaction an unusual march of progress, the evidence of which is obvious to any observer who has given the past conditions and the present any consideration whatsoever. With each step greater confidence, as well as expectancy, may be noted in the board, administration, students, and such alumni as are close enough to the picture to make the observations. This confidence and expectancy have grown slowly as every department of the school structure, from the board, administration, faculty and students, showed evidence of an evolutionary change characterized by a greater stability, integrity and capacity, which will carry our Alma Mater to its destined goal and rightful place among its kindred institutions.

Achievement is not a graft of an external fortune upon some haphazard undertaking. It lies in the integrity and potency of the undertaking itself. It must also be true in our school. If it is to achieve its rightful place among contemporary schools of medicine, we who are of it and in it must supply it with the potency and integrity that will make it grow. No hand of fortune can lend to its progress more than a complement of what we ourselves give to it. It must be our effort, our work, our sacrifice, our enthusiasm and our material support that supply and operate the fulcrum and lever which will raise our school to its dedicated goal.

Energy is not wasted anywhere in nature. The energy used in a conscious effort towards any objective is dynamic and culminative. It brings results. We have within our ranks the energy and resources to bring our school slowly to a second-to-none place among medical institutions. We must harness these resources and use them to bring about the changes that are now about to occur. These changes are inevitable, for The Chicago Medical School is on a march of progress which cannot be stopped.

THE INTERNAL TREATMENT OF SYPHILIS WITH STOVARSOL (ACETARSONE

(*Continued from Page* 5)

gumma of larynx and pharynx, and in cases sensitive to salvarsan, but also in severe forms of tertiary syphilis (mesoaortitis, syphilis of cerebrospinal fluid) and perhaps also in paralysis of tabes and in the control of positive findings in cerebrospinal fluid. Under certain conditions it may be given in combination with mercury or bismuth but in general it cannot replace them. It is of value to administer stovarsol in cases of chronic intermittent syphilis.

In United States, A. S. Zakon, McGregor, and many others have acknowledged the value of acetarsone and it won't be very long before the internal administration of acetarsone will play a permanent part of anti-syphilitic treatment.

Dr. Maurice Oppenheim, Court Councillor and formerly Professor of the University of Vienna Austria, was born in Vienna of a very old Viennese family. He attended the "Akademisches Gymnasium" and studied medicine at the Medical School of the University of Vienna. After his military service, he became assistant to Professor Isidor Neumann and Professor Ernst Finger at the University Clinic in the "Allgemeines Krakenhaus" (General Hospital) in Vienna. In 1902, Dr. Oppenheim went to India, where he spent some time at the Lepra Asylum Matunga, British India. In 1906, he became Privatdozent, (instructor) and was appointed Professor at the University of Vienna in 1915. He then advanced steadily, was awarded the title "Hofrat" (Court Councillor), in 1936. For 25 years, he was chief of the Department of Dermatology and Venereal Diseases at the Wilheminen Hospital in Vienna.

He is now invited permanent guest of the Chicago Dermatological Society, and Corresponding Member of the American Dermatological Association. He further is Honorary and Corresponding Member of several Dermatological Societies in the old and new world. He is Professor of Dermatology and Syphilology at The Chicago Medical School.

Organizations

THE ASSOCIATION OF MEDICAL STUDENTS

Four years ago a group of students at The Chicago Medical School, recognizing the need for a more intimate relationship amongst themselves and students of other medical schools, undertook the formation of a chapter of the Association of Medical Students. Since its inception, the chapter has firmly established itself as one of the leading student organizations of the school. The best evidence of this is the enrollment of the majority of students as members.

As a result of several executive meetings, a tentative plan of action was formulated. A series of meetings of educational interest was arranged. This program was initiated with a talking motion picture of a "Low Cervical Caesarian Section" loaned to the Chapter by Dr. Joseph B. Lee of the Chicago Lying-in Hospital and Dispensary. The large turnout and splendid reception labeled the meeting a great success. This was followed by an excellent lecture on "Uterine Ligaments and Pelvic Floor," delivered by Dr. H. Sicher of our own Anatomy department. The final meeting of the term was addressed by Dr. H. Popper of Cook County Post Graduate School of Medicine. His lecture on "The Use of the Fluorescent Miscroscope in the Determiation of Vitamin A Content of Tissues" was extremely interesting and very well received.

A plan for group buying was formulated. Contact was established with the national organization and assistance given in some of the important general issues undertaken by the Association of Medical Students. Arrangements were made for sending delegates to the national convention in Boston.

Through such an association and its concerted action, many benefits may be derived which are ordinarily not attainable by the individual. It is impossible, however, for a few individuals to undertake the fulfillment of any such program, and it is not the purpose of the organization to have such a condition exist.. We have here the mechanism for a better interclass relationship. The regional and national affiliations of the Chapter with other groups of individuals having the same interests and problems provide the channels for an interchange of ideas and the opportunity of working together.

NU SIGMA CHI

A medical fraternity founded on all the ideals which "fraternity" implies was the ambition of a group of Chicago Medical School students who met on May first, 1925, to draw up a constitution.

The organization is founded on a strict non-sectarian basis. Any male student is eligible if he shows proof of good moral character and a satisfactory degree of mental capability and scientific disposition. The ideals of Nu Sigma Chi are to promote and maintain a perpetual bond of good fellowship among the members of the organization; to encourage its members in school and in the practice of medicine; to afford mutual help in all their undertakings whether within or without the organization; to promote and maintain social relationship.

THE RIB FRATERNITY

The Rib Fraternity was the first of the now active fraternal groups founded at C.M.S.

It was established to further good-fellowship and scholastic endeavor among the students of C.M.S.

At the present there are thirty-six active members, with 140 alumni.

Election of new officers and initiation of new members will take place the second week of January.

PHI LAMDA KAPPA

The main activity during the first month of school was confined to the selection of pledges.

The annual Thanksgiving affair was held on the 22nd of November in the Marine Dining Room of the Edgewater Beach Hotel. Wayne King and his orchestra supplied the music for dancing and also the accompaniment to an excellent floor show.

All the energy of The Chicago Medical School Chapter is now being devoted to the annual convention, which is being held during the Christmas vacation in Chicago.

Our series of bimonthly dinner meetings will soon get under way, at which the privilege of hearing speakers on both medical and current problems will again be enjoyed.

We all look forward to a year of great accomplishment in building Phi Lambda Kappa into a worthwhile asset at The Chicago Medical School.

XUM

TUBERCULOSIS AND GENIUS

(*Continued from Page* 25)

military affairs; and Laennec, Ehrlich, Rush, Locke and Trudeau in the field of medicine. Other immortal names to be included in this list are Katherine Mansfield, Moliere, and Saint Francis of Assisi.

Moorman in his recent book says that "the ideas of these geniuses are equivalent in power, electrodynamically considered, to the amount of energy required to light a city like New York in virtual perpetuity." Are we not activated still, militarily and otherwise, by Schiller's conception of liberty? Our entire defense program and that of Great Britain can be related to the thinking of Schiller. Do we not still proceed upon Voltaire's and Moliere's premise of the free mind?

From all this, it can be seen that some of the world's most brilliant work was done by these figures when the disease of tuberculosis was in an active state and, at times, in its last stages. It can be said in conclusion, that the ravages of tuberculosis have deadened the minds of many incipient personalities in all fields of endeavor and have robbed the world of much potential beauty and accomplishment.

THE COUNTRY DOCTOR

(*Continued from Page* 22)

rumor—somebody's wild idea! "Why, you know Doc", they'd say, "He's been here for years. Yes sir, delivered all my kids; took care of little Johnny when he had the flu." You can hear expressions like this throughout the town. They're a little grimy down there, but they're human and sensitive to their wants and needs; they know their problems, and "Doc" is God to many of them. And therein lies his sole reward—his place in the sun—so to speak, and you can almost feel the halo as it forms around him.

He and the men like him are the unknown soldiers of medicine until another five babies are born to herald their work. I can think of no other words to describe it than those which are so solidly engraved on one of the greater buildings of the greatest city. "Neither storm nor sleet nor gloom of night shall stay these couriers from the swift completion of their appointed rounds."

We, as well as the townfolks, owe our respects to him. There's magic in his hands and in that little black bag.

BLOOD TRANSFUSION
Its History and Equipment

INTERESTING

YOU ARE INVITED to see our famous exhibit of ancient and modern Blood Transfusion Apparatus, now on display in our main showroom.
Actual instruments depict the development from the bladder and quills used by Wren in England (1656), to the equipment of the present day. Each is labeled with the designer's name, date of use, and a brief sketch of the instrument.
See at first hand the crude beginnings from which modern blood transfusion equipment has come . . . and while you're here, too, inspect the forerunners of other modern surgical instruments. The historic instruments in the cases that line the walls are museum pieces that have been displayed all over the country.
Come in soon! You'll find the display interesting and a helpful background for your own studies. No obligation, of course.

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